Technology

Two Men, Two Visions of One Co

An 'open hyperdocument system' - or Xanadu.

By ANDREW POLLACK

SAUSALITO, Calif. ITH computer technology advancing at a lightning pace, it's hard to imagine that anyone could work on the same project for more than 30 years — and still not finish it. But that is the case with two legendary figures of computerdom: Theodor Holm Nelson and Douglas C. Engelbart.

The two men are very different.

Ted Nelson is an outspoken author and visionary described as everything from "the Thomas Paine of the personal computer revolution" to a "madman extraordinaire."

Doug Engelbart is a soft-spoken engineer who invented the computer mouse, on-screen windows and several other techniques that are only now coming into widespread use. In a sense, Silicon Valley has spent the last 20 years implementing ideas Dr. Engelbart first demonstrated in the 1960's.

But Mr. Nelson and Dr. Engelbart have separately been pursuing very similar visions for three decades, and both know the frustration of falling short. "Trying to follow a crusading pursuit is not a very rewarding career path," said Dr. Engelbart.

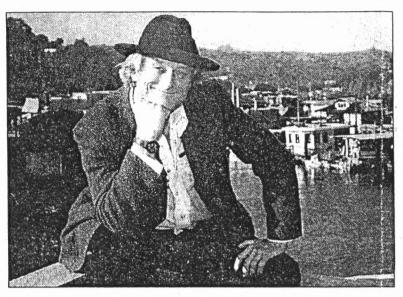
The vision both have in common is called hypertext, a way of organizing vast amounts of information to be viewed on computers.

With paper documents, one usually reads from beginning to end in a linear fashion. With electronic information, it is easier to jump around because the computer can deliver any piece of information instantly. While perusing an article about Columbus, for instance, a reader might come upon a reference to Queen Isabella. With hypertext, the reader could press a button and jump to information about her, and from there to a passage about the Inquisition, and so on.

Hypertext is embodied in Apple Computer's Hypercard software and many other products. But both Mr. Nelson and Dr. Engelbart envision far more ambitious systems, linking networks of computers in which anybody could enter and retrieve information.

Dr. Engelbart, the engineer, calls his idea an "open hyperdocument system." Mr. Nelson, the wordsmith, calls his idea Xanadu, after Kubla Khan's legendary pleasure dome. "Once you're in Xanadu, the old computer world goes away," said Mr. Nelson.

Mr. Nelson has been pursuing hypertext since 1961, when he was a graduate student in sociology and wanted to organize his notes. He formed the Xanadu Operating Company to develop the necessary software in 1979. Some of the company's programmers have been working on it ever since, taking time off



Ted Nelson of Autodesk, wordsmith and visionary.

to get other jobs when money ran out but always returning to pursue the quest. Mr. Nelson kept saying Xanadu was close to being finished; it never was.

In 1988, Autodesk, a leading personal computer software company, bought 80 percent of Xanadu and put the company on a firm financial footing. Mr. Nelson became a "distinguished fellow" at Autodesk and lives in a houseboat near the company's office in this town near the Golden Gate Bridge.

The programmers, however, are kept 40 miles away in Palo Alto and now have little contact with Mr. Nelson. Sensitive to the credibility issue, they say a ver software might be ready — for t six months to a year. "We're doi to keep our heads down until we thing solid to show," said Chris H manages the software developme

Xanadu will be a database prog people work together and keep tra ments. For example, an architec able to point to a spot on a blu immediately jump to a memo exp reasons behind that part of the de one reading a document that q another document will be able

Tech Notes

Lasers for the Dentist

UCH medical surgery these days begins not with the decisive slice of a scalpel but with the deft application of a strand of light - a continuous-beam laser that incises with less bleeding and less post-surgery discomfort. But such lasers work essentially by burning and thus are inappropriate in some applications - routine dentistry, for one.

But Sunrise Technologies Inc., a four-yearold medical laser company in Fremont, Calif., has made the heat problem moot by turning the continuous beam into a series of pulses that occur too quickly to burn. The company's neodymium yttrium-aluminumgarnet laser, called the dLASE 300, pulses for one six-thousandth of a second at different speeds along a quartz optical fiber one-third of a millimeter in diameter through a handpiece and out the tip. (Quartz can accommodate the bursts of light without day The fiber transmits the laser wi loss of energy and is flexible, a cru

of course, to dentists. Last year, Sunrise won approva Food and Drug Administration to pulsed laser for use on soft tissue i mouth, in such procedures as ging mies, gum contouring and minor's About 1,000 of the \$50,000-plus lase been sold, Sunrise said.

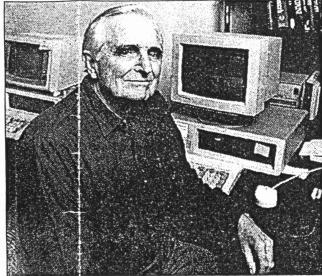
Dr. Arthur Vassiliadis, presiden executive of Sunrise, who has tried on himself, says most patients do anything as the work is being done get a little tingling or a slight warr what the brain registers as pain,'

Last month, the F.D.A. authoriz for procedures on hard human tiss

BARBARA PRESL

e Computer World, Indivisible





Douglas Engelbart of Bootstrap, engineer.

they say a version of the be ready - for testing - in year. "We're doing our best is down until we have someow," said Chris Hibbert, who tware development.

e a database program to help ether and keep track of documple, an architect might be a spot on a blueprint and np to a memo explaining the hat part of the design. Somedocument that quotes from ent will be able to jump in-

f light without damage.) smits the laser with little d is flexible, a crucial factor,

rise won approval from the dministration to market the use on soft tissue in the rocedures as gingivectouring and minor surgery. e \$50,000-plus lasers have

ssiliadis, president and chief rise, who has tried the laser most patients do not feel work is being done. "Some ng or a slight warmth, but not egisters as pain," he said. he F.D.A. authorized testing on hard human tissue - teeth ARBARA PRESLEY NOBLE stantly to the source document. Users will be able to comment on something they read, and other readers will be able to jump from the document to those comments. People will also be able to put detectors into documents, to alert them automatically if someone subsequently comments on a particular passage.

A key to Xanadu is that each piece of information is stored only once but can be incorporated into many different documents, thereby saving disk space. On paper, if an author excerpts a passage from another person's work, he or she copies it, so that passage now exists both in the original and in the new work. But in Xanadu, the new document only creates a link to the excerpt in the original document. One byproduct is that this allows the system to keep track of who is quoting whom, thus providing a basis for royalty payments on copyrighted material.

When, or if, Xanadu finally appears, Autodesk is expected to sell it to corporations. But Mr. Nelson wants to create a Xanadu for public use, to store and collect the knowledge of the world. That will require new funding and, the 54-year-old Mr. Nelson concedes, will take the rest of his life.

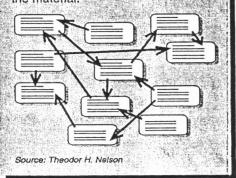
For the 66-year-old Dr. Engelbart, the idea is to help organizations make faster and better decisions. It was in working toward that goal in the 1960's, when he was at the Stanford Research Institute, that Dr. Engelbart came up with ideas like the mouse, windows and hypertext.

In 1977, Dr. Engelbart moved to Tymshare Inc., a computer service provider that sold his system under the name Augment (as in augment human intelligence). But Augment was offered on big computers, and business faded when personal computers proliferated.

In 1989, Dr. Engelbart set up the Bootstrap Project to try to interest companies in using his techniques to "bootstrap" themselves

A Library at Your **Fingertips**

Hypertext can be envisioned as data arranged on imaginary notecards. The reader jumps from card to card, choosing his or her own path through the material.



The New York Times

toward better performance. Initial funding came from Apple Computer, Sun Microsystems and Mitch Kapor, the founder of the Lotus Development Corporation.

But that funding ran out and, partly because times are tough, partly because Dr. Engelbart's ideas are somewhat difficult to understand, has not been replaced. He now runs Bootstrap with his daughter Christina Engelbart, operating out of a donated office in Fremont, Calif., and trying to keep the project alive with seminars and videotapes.

T might seem that Dr. Engelbart and Mr. Nelson could join forces. Indeed, Dr. Engelbart thought of using Xanadu as the underlying software upon which he could build a new version of Augment. But he could not reach an agreement with Autodesk.

Both men now face advancing age and competition from numerous other companies already producing software that helps workers collaborate and keep track of documents. Lotus's Notes program is one example.

Both Mr. Nelson and Dr. Engelbart think these solutions fall short of their ultimate visions. But perhaps that is how the technology is destined to develop, piece by piece rather than in one all-encompassing leap. In that sense, these developments by others are not so much a threat to the two pioneers as a sign that their visions will be realized, though perhaps not by themselves.

"Doug is like Moses," said Paul Saffo, 'a researcher at the Institute for the Future in Menlo Park, Calif. "He's leading us toward the information Promised Land but he will probably never enter it himself." Mr. Saffo also doubts that Mr. Nelson's Xanadu will ever be finished.

"Neither will probably ever reach their goals," he said. "But even if they fall short, they fall forward, and all of us benefit."